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14. ABSTRACT IPDO-2007 Symposium's main objectives were to bring the three communities of researchers (inverse problems experts, design theory experts, and optimization experts) together and provide a common forum for presenting different applications, problems, and solution strategy concepts. These three areas of research covered by the IPDO Symposium have a number of things in common. For example, many methodologies for solving inverse problems employ optimization algorithms. However, there are no optimization algorithms that employ methods of inverse design that could substantially reduce the number of time-consuming analysis required by the typical evolutionary optimization algorithms. Similarly, design theory is not well					
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## Report Title

IPDO-2007 - INVERSE PROBLEMS, DESIGN AND OPTIMIZATION SYMPOSIUM

### ABSTRACT

IPDO-2007 Symposium's main objectives were to bring the three communities of researchers (inverse problems experts, design theory experts, and optimization experts) together and provide a common forum for presenting different applications, problems, and solution strategy concepts. These three areas of research covered by the IPDO Symposium have a number of things in common. For example, many methodologies for solving inverse problems employ optimization algorithms. However, there are no optimization algorithms that employ methods of inverse design that could substantially reduce the number of time-consuming analysis required by the typical evolutionary optimization algorithms. Similarly, design theory is not well known in the optimization community where formulation of the appropriate multiple objectives and system-of-systems design formulations are often performed using intuition and personal experience. The IPDO-2007 Symposium thus offered a unique international forum that was expected to provide an excellent basis for cross-fertilization of ideas and creation of new synergistic approaches and methodologies that will combine the three fields of research so that more general, robust, accurate and computationally economical design methods are created for multi-disciplinary applications. Contributions dealing with practical applications were encouraged, such as in petrochemistry, aeronautics, bio-medicine, sensing of pollutants, materials processing, non-destructive evaluation, material property determination, etc.

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**List of papers submitted or published that acknowledge ARO support during this reporting period. List the papers, including journal references, in the following categories:**

#### **(a) Papers published in peer-reviewed journals (N/A for none)**

**Number of Papers published in peer-reviewed journals:** 0.00

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#### **(b) Papers published in non-peer-reviewed journals or in conference proceedings (N/A for none)**

**Number of Papers published in non peer-reviewed journals:** 0.00

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#### **(c) Presentations**

**Number of Presentations:** 0.00

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#### **Non Peer-Reviewed Conference Proceeding publications (other than abstracts):**

**Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):** 0

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#### **Peer-Reviewed Conference Proceeding publications (other than abstracts):**

1. Approximation of the Likelihood Function in the Bayesian Technique for the Solution of Inverse Problems (with Orlande, H.R.B. and Colaco, M.J.), International Symposium on Inverse Problems, Design and Optimization (IPDO-2007), (eds.: Dulikravich, G.S., Orlande, H.R.B., Tanaka, M. and Colaco, M.J.), Miami Beach, FL, April 16-18, 2007.
2. Multiobjective Nonlinear Shape Optimization of Stent Based on Evolution Principles (with Annicchiarico, W.), International Symposium on Inverse Problems, Design and Optimization (IPDO-2007), (eds.: Dulikravich, G.S., Orlande, H.R.B., Tanaka, M. and Colaco, M.J.), Miami Beach, FL, April 16-18, 2007.
3. A Comparison of Two Methods for Fitting High Dimensional Response Surfaces (with Colaco, M. J. and Sahoo, D.), International Symposium on Inverse Problems, Design and Optimization (IPDO-2007), (eds.: Dulikravich, G.S., Orlande, H.R.B., Tanaka, M. and Colaco, M.J.), Miami Beach, FL, April 16-18, 2007.
4. Inverse Approaches to Drying of Sliced Foods (with Kanevce, G. H., Kanevce, Lj. P., and Mitrevski, V. B.), International Symposium on Inverse Problems, Design and Optimization (IPDO-2007), (eds.: Dulikravich, G.S., Orlande, H.R.B., Tanaka, M. and Colaco, M.J.), Miami Beach, FL, April 16-18, 2007.
5. Inverse Approaches in Improvement of Air Pollution Plume Dispersion Models for Regulatory Applications (with Kanevce, G. H., Kanevce, Lj. P., and Andreevski, I. B.), International Symposium on Inverse Problems, Design and Optimization (IPDO-2007), (eds.: Dulikravich, G.S., Orlande, H.R.B., Tanaka, M. and Colaco, M.J.), Miami Beach, FL, April 16-18, 2007.

(d) Manuscripts

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- Number of Manuscripts:

3.00

Number of Inventions:

Graduate Students

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Post Doctorates

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Faculty Supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Under Graduate students supported

<u>NAME</u>	<u>PERCENT SUPPORTED</u>
FTE Equivalent:	
Total Number:	

### Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: ..... 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale): ..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense ..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: ..... 0.00

### Names of Personnel receiving masters degrees

NAME

Total Number:

### Names of personnel receiving PhDs

NAME

Total Number:

### Names of other research staff

NAME

PERCENT SUPPORTED

FTE Equivalent:

Total Number:

### Sub Contractors (DD882)

### Inventions (DD882)



**FINAL REPORT  
(10/01/06 – 08/31/07)**

# **IPDO-2007 - INVERSE PROBLEMS, DESIGN AND OPTIMIZATION SYMPOSIUM**

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**<http://maidroc.fiu.edu>**  
**<http://www.tandf.co.uk/journals/titles/17415977.asp>**  
**<http://www.ipdos.org/ipdo2007>**

## **1. Foreword**

Inverse problems, design theories and multi-objective constrained optimization strategies are three areas of advanced research that are rapidly becoming of common use by practicing engineers and designers. Consequently, there is an upsurge in the number of separate scientific meetings in each of these three general areas. The main objective of the IPDO-2007 - INVERSE PROBLEMS, DESIGN AND OPTIMIZATION SYMPOSIUM held April 16-18, 2007 in Miami Beach, Florida was to bring together the three communities of researchers (inverse problems, design theory and evolutionary optimization experts) and provide a common forum for presenting different applications, problems and solution concepts. IPDO Symposium is a sequence of international technical meetings that was preceded by the following meetings:

ICIDES-I organized by G.S. Dulikravich (University of Texas at Austin, 1984)  
ICIDES-II organized by G.S. Dulikravich (Pennsylvania State University, 1987)  
ICIDES-III organized by G.S. Dulikravich (Washington, DC, 1991)

The IPDO-2007 Symposium is the second in the IPDO sequence. The first IPDO Symposium was IPDO-2004 organized by G.S. Dulikravich, H.R.B. Orlando and M.J. Colaco and held in Rio de Janeiro in March of 2004.

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### 4. Statement of the Problem Studied

IPDO Symposium's main objectives were to bring the three communities of researchers (inverse problems experts, design theory experts, and optimization experts) together and provide a common forum for presenting different applications, problems, and solution strategy concepts. These three areas of research covered by the IPDO Symposium have a number of things in common. For example, many methodologies for solving inverse problems employ optimization algorithms. However, there are no optimization algorithms that employ methods of inverse design that could substantially reduce the number of time-consuming analysis required by the typical evolutionary optimization algorithms. Similarly, design theory is not well known in the optimization community where formulation of the appropriate multiple objectives and system-of-systems design formulations are often performed using intuition and personal experience. The IPDO-2007 Symposium thus offered a unique international forum that is expected to provide an excellent basis for cross-fertilization of ideas and creation of new synergistic approaches and methodologies that will combine the three fields of research so that more general, robust, accurate and computationally economical design methods are created for multi-disciplinary applications. Contributions dealing with practical applications were encouraged, such as in petrochemistry, aeronautics, astronautics, bio-medicine, transport and sensing of pollutants, materials processing, remote sensing, non-destructive evaluation, material property determination, acceleration of optimization procedures, etc.

### 5. Summary of the Most Important Results

Location of IPDO-2007: The location for the IPDO-2007 Symposium was Newport Beachside Resort Hotel, 16701 Collins Avenue, Miami Beach, Florida, U.S.A. With a privileged location right on the beach, this hotel has one of the central and most stunning views of the famous North Miami Beach and it is ideal for those who are traveling on business or leisure. When reserving a hotel room, attendees were alerted to mention that it is for the IPDO-2007 so that they can obtain a negotiated reduced rate. Details were made available on the website <http://mcolaco.freeshell.org/ipdo2007/index.htm>

Convention Center: The hotel has three meeting rooms for up to 160 people, including a business center with a computer, FAX, and Xerox copying. For those desiring Internet access, we have negotiated with the hotel to provide wireless Internet access free of charge.

Transportation: For the conference participants, the flight destination shall be either Miami International Airport (MIA) or Fort Lauderdale Airport (FLL). Both airports are served by major airline carriers, with everyday flights from many cities in North America, Central and South America and Europe. Transportation from either of the two airports to the conference hotel on North Miami Beach is available either by bus (approximately \$15 one way) or by taxi (approximately \$40 one way) and it takes 30-45 minutes depending on traffic.

Registration Fees: All participants (including members of the organizing committee and invited speakers) were required to register and pay a registration fee according to the following table.

**Table 1. Registration fees and rates**

	Until February 1, 2007	After January 31, 2007
Participant	US \$325.00	US \$400.00
Graduate Student (with a proof of their status)	US \$180.00	US \$225.00
Guest (not attending technical sessions)	US \$180.00	US \$225.00

Registration fees were collected by the representatives of the FIU Student Chapter of the American Society of Mechanical Engineers. These funds were used to pay hotel fees (rental of conference rooms, food and drinks for the entire meeting including a reception on Sunday, April 15, 2007 and taxes). The registration fees were also used to pay for bags, T-shirts,

caps, ball pens, printing of the Books of Abstracts, production of CDs with the abstracts, printing of volumes of IPDO-2007 paper proceedings, production of CDs with final papers, payment of travel expenses for several of the invited speakers, payment of PayPal service, and payment of FIU Student ASME chapter staff services.



Fig. 1 A view from a balcony of Newport Beachside Resort Hotel, Miami Beach, Florida

### 5.1 ARMY RESEARCH OFFICE GRANT USE

This grant was for financial co-sponsorship of IPDO-2007 Symposium. Specifically, it was strictly for payment of stipends for several invited speakers as follows:

**Table 2. Invited speakers stipends partially financed by this grant**

Account charged	Army Research Office grant W911NF-07-1-0230 to Florida International University			
Name of the invited speaker paid	Helmut Sobieczky (Germany)	Nirupam Chakraborty (India)	Alexander Ramm (U.S.A.)	Marcelo Colaco (Brazil)
Amount paid	\$1,000.00	\$1,500.00	\$1,120.00	\$1,380.00
Form of payment	a single check	a single check	a single check	a single check

### 5.2 ORGANIZING COMMITTEE FOR IPDO-2007

The realization of the IPDO Symposium evolved from the scientific collaboration involving Prof. George S. Dulikravich, from Florida International University, Prof. Helcio R. B. Orlande, from the Federal University of Rio de Janeiro (Brazil), Prof. Masataka Tanaka from Shinshu University, Nagano (Japan), and Prof. Marcelo J. Colaço, from the Military Institute of Engineering (Brazil). They created the organizing committee for the symposium as follows:

CHAIR: Prof. George S. Dulikravich  
CO-CHAIR: Prof. Helcio R. B. Orlande  
CO-CHAIR: Prof. Masataka Tanaka  
SECRETARY: Prof. Marcelo J. Colaço

### 5.3 INTERNATIONAL SCIENTIFIC COMMITTEE FOR IPDO-2007

The International Scientific Committee was composed of recognized experts in Inverse Problems, Design and Optimization, from the five continents and several countries. The committee supported the symposium mainly through the



evaluation of all submitted contributions. In addition, many members of this committee attended the symposium to present papers and invited/keynote lecturers. The international scientific committee of the IPDO-2007 Symposium is presented below.

Prof. Brian H. Dennis (USA)  
Prof. Jay I. Frankel (USA)  
Prof. John R. Howell (USA)  
Prof. Yvon Jarny (France)  
Prof. Jari P. Kaipio (Finland)  
Prof. Alain J. Kassab (USA)  
Prof. Karl-Jörg Langenberg (Germany)  
Prof. William R. B. Lionheart (UK)  
Prof. A. Haji-Sheikh (USA)  
Prof. Giulio Maier (Italy)  
Prof. Guoping Miao (PR China)  
Prof. John C. Schotland (USA)  
Prof. Antonio J. Silva Neto (Brazil)  
Prof. Robert Throne (USA)  
Prof. Pavel Trivailo (Australia)  
Prof. Keith A. Woodbury (USA)  
Prof. Anatoly G. Yagola (Russia)

#### **5.4 SPONSORS AND PROMOTERS OF IPDO-2007**

AFOSR/Numerical Mathematics (United States Air Force Office of Scientific Research)  
ARO/Materials Division (United States Army Research Office)  
Taylor & Francis Publishers (United Kingdom)  
ESTECO – modeFRONTIER (Italy)  
SIGMA Technology – IOSO Technology Center (Russia)  
ASME FIU Student Section (ASME/Florida International University, U.S.A.)  
UFRJ (Federal University of Rio de Janeiro, Brazil)

#### **5.5 CALL FOR ABSTRACTS FOR IPDO-2007**

Three times during fall/winter of 2006/2007, the following Call for Papers was e-mailed to approximately 10,000 colleagues throughout the world.

International Symposium on  
*INVERSE PROBLEMS, DESIGN AND OPTIMIZATION (IPDO-2007)*  
Miami Beach, Florida, U.S.A., April 16-18, 2007.

IPDO Symposium's main objectives are to bring the three communities of researchers (inverse problems experts, design theory experts, and optimization experts) together and provide a common forum for presenting different applications, problems, and solution strategy concepts. These three areas of research to be covered by the IPDO Symposium have a number of things in common. For example, many methodologies for solving inverse problems employ optimization algorithms. But, there are no optimization algorithms that employ methods of inverse design that could potentially substantially reduce the number of time-consuming analysis required by the typical evolutionary optimization algorithms. Similarly, design theory is not well known in the optimization community where formulation of the appropriate multiple objectives and system-of-systems design formulations are often performed using intuition and personal experience. The IPDO Symposium thus offers a unique international forum that is expected to provide an excellent basis for cross-fertilization of ideas and creation of new synergistic approaches and methodologies that will combine the three fields of research so that more general, robust, accurate and computationally economical design methods are created for multi-disciplinary applications.

Organizers:

G.S. Dulikravich (chair), H.R.B. Orlande (co-chair), M. Tanaka (co-chair), M.J. Colaco (secretary)

Sponsors:

AFOSR (United States Air Force Office of Scientific Research)

ARO (United States Army Research Office)

T&F (Taylor & Francis Publishers)

ESTECO (Europe)

Sigma Technology (Russia)

FIU (Florida International University)

UFRJ (Federal University of Rio de Janeiro)

Areas of interest:

The IPDO-2007 Symposium will emphasize a broad range of deterministic, statistical, analytical, computational and experimental approaches, which can be applied to the solution of inverse, design and multi-disciplinary optimization problems. Contributions dealing with theoretical concepts and practical applications are encouraged, such as in petrochemistry, aeronautics, astronautics, bio-medicine, transport and sensing of pollutants, materials design and processing, remote sensing, non-destructive evaluation, material property determination, acceleration of large scale optimization, design theory, etc.

#### Deadlines:

1 October, 2006 proposals for organizing technical sessions (six papers per session)  
 1 November, 2006 deadline for submission of two-page abstracts in .pdf format  
 1 December, 2006 informing authors about acceptability of abstracts  
 1 February, 2007 deadline for submission of full eight-page papers  
 1 March, 2007 deadline for early registration

#### Abstracts and papers:

Please submit two-page abstracts (including preliminary results, basic figures, formulas, and references) in .pdf format to the following e-mail addresses: IPDO2007@GMAIL.COM, IPDO2007@YAHOO.COM

All accepted two-page abstracts will be published in a Book of Abstracts provided to all participants during IPDO-2007.

IPDO-2007 Web Page: <http://ipdo.freeshell.org/ipdo2007/index.htm>

For information contact: George S. Dulikravich; tel. +1 (305) 348-7016; E-mail: [dulikrav@fiu.edu](mailto:dulikrav@fiu.edu)

## 5.6 IPDO-2007 SYMPOSIUM AGENDA

The ipdo-2007 Symposium lasted three days with two keynote lectures each day. The Symposium involved two parallel sessions every morning and afternoon. Each session started with one 50 minute invited presentation followed by 6-8 contributed papers each taking 20 minutes. This means that there were a total of 6 keynote lectures and 93 contributed papers totaling 99 papers presented at IPDO-2007.

Finally, there was a round-table discussion involving the entire audience of the IPDO-2007 Symposium that attempted to summarize the entire meeting and bring forward a consensus list of recommendations concerning the most promising future directions in research that involves the three areas covered by the IPDO-2007. In addition, the IPDO-2007 participants were informed by the organizers that they are all invited to join in the efforts to form an international society of professionals working in these three areas of research.

## 5.7 KEYNOTE LECTURES

Keynote Lecture 1 (08:40-09:30, April 16, 2007 – Room 1):

*RECENT ADVANCES IN INFERENTIAL SOLUTIONS TO INVERSE PROBLEMS*

Keynote Lecture 2 (14:00-14:40, April 16, 2007 – Room 1):

*MULTI-OBJECTIVE MDO SOLUTION STRATEGY FOR MULTIDISCIPLINARY DESIGN USING modeFRONTIER*

Keynote Lecture 3 (08:40-09:30, April 17, 2007 – Room 1):

*FLUID FLOW IN HYDROCYCLONES OPTIMIZED THROUGH MULTI-OBJECTIVE GENETIC ALGORITHMS*

Keynote Lecture 4 (14:00-14:40, April 17, 2007 - Room 1):

*USING OF THE IOSO NM SOFTWARE FOR COMPLEX OPTIMIZATION PROBLEMS*

Keynote Lecture 5 (08:40-09:30, April 18, 2007 – Room 1):

*CREATING WAVE-FOCUSING MATERIALS*

Keynote Lecture 6 (14:00-14:40, April 18, 2007 – Room 1):

*VARIABLE SURFACES FOR AEROSPACE DESIGN AND OPTIMIZATION*

**Table 3. IPDO-2007 SYMPOSIUM PROGRAM**

	April 15, 2007 Sunday	April 16, 2007 Monday		April 17, 2007 Tuesday		April 18, 2007 Wednesday	
7:45 – 8:40		Atlantis Room - Breakfast		Atlantis Room - Breakfast		Atlantis Room - Breakfast	
08:20–08:40		Opening of the IPDO					
08:40–09:30		Keynote Lecture 1 Colin Fox –151		Keynote Lecture 3 Nirupam Chakraborti -141		Keynote Lecture 5 Alexander Ramm - 140	
		Atlantis Room Alifanov	Tiffany I Room Lesnic	Atlantis Room Kassab	Tiffany I Room Silva Neto	Atlantis Room Emery	Tiffany I Room Szczygiel
09:30– 09:50		130	004	117	100	066	052
09:50– 10:10		062	011	118	103	152	053
10:10– 10:30		061	012	084	082	071	015
10:30– 10:50		Food/Drinks Break	Food/Drinks Break	Food/Drinks Break	Food/Drinks Break	Food/Drinks Break	Food/Drinks Break

10:50– 11:10		132	024	108	092	042	056
11:10– 11:30		003	025	127	067	068	060
11:30– 11:50		020	128	010	075	116	043
11:50– 12:10		041	129	095	078	047	069
12:10–13:30		Lunch Tiffany II	Lunch Tiffany II	Lunch Tiffany II	Lunch Tiffany II	Lunch Tiffany II	Lunch Tiffany II
		Atlantis Room		Atlantis Room		Atlantis Room	
13:30–14:20	Mezzanine area in the Newport Beachside Hotel, 16701 Collins Av. Miami Beach, FL <b>Registration:</b> <b>Sunday</b> <b>13:30-19:00</b> <b>cash or bank certified checks (no credit cards)</b> <b>M-W</b> <b>8:00-4:30</b>	<b>Keynote Lecture 2</b> <i>Sumeet Parashar - 149</i>		<b>Keynote Lecture 4</b> <i>Igor Egorov- 109</i>		<b>Keynote Lecture 6</b> <i>Helmut Sobieczky – 086</i>	
		Atlantis <i>Colaço</i>	Tiffany I <i>Bagtzoglou</i>	Atlantis <i>Michopoulos</i>	Tiffany I <i>Woodbury</i>	Atlantis <i>Kanevce</i>	Tiffany I <i>Dennis</i>
14:20–14:40		150	144	077	098	107	031
14:40–15:00		101	145	085	097	099	088
15:00–15:20		112	091	104	122	063	044
15:20–15:40		090	081	013	083	120	072
15:40–16:00		006	093	008	148	131	137
16:00–16:20		Food/Drinks Break	Food/Drinks Break	Food/Drinks Break	Food/Drinks Break		
16:20–16:40		105	110	049	146		
16:40–17:00		106	111	050	009		
17:00–17:20	17:00–19:00 <b>Reception party (food and drinks in the mezzanine area)</b>	143	139	058	035		
17:20–17:40		126	028	054	039		
17:40–18:00		087	021	133			
18:00–18:20		073	138				

## 5.8 PLANS FOR COOPERATIVE ACTIVITIES EMERGING FROM THE IPDO-2007

The main objective of the IPDO-2007 Symposium was to bring together researchers from different world regions, dealing with different inverse problems, design concepts and evolutionary multi-disciplinary optimization strategies, for the presentation of their most recent research results and for the technical discussion of their findings. Traditionally, it has been the heat and mass transfer community that has developed some of the most practical methodologies for solving the pertinent inverse problems in diverse applications. IPDO-2007 was clearly successful in bringing together an extremely diverse audience that included inverse problems experts, multi-objective constrained optimization experts and a community dealing with the automatic robust design theories. The fields of applications were equally diverse ranging from biomedicine, material science, materials processing, algorithm developments, solid mechanics, fluid mechanics, electromagnetism, aerospace, structural dynamics, heat transfer, non-destructive evaluations, etc.

At the IPDO-2007 Symposium, an announcement was made by the organizing committee that a new international society for inverse problems is currently been formed and that all IPDO participants are invited to become members once the official announcement is disseminated via Internet. This new society will bring together applied mathematicians, engineers, physicists, chemists, etc. that are interested in developing and utilizing methods and algorithms applicable to the solution of multi-disciplinary inverse problems, design and optimization.

## 6. Listing of all publications and technical reports supported under this grant or contract

### 6.1 PUBLICATIONS AND DISSEMINATION OF RESULTS

**Printed Proceedings:** Extended abstracts (two pages maximum) of all papers submitted for presentation at the IPDO-2007 Symposium (including the 6 keynote lectures) were refereed by a minimum of two anonymous reviewers. A book of abstracts and a CD-ROM containing all accepted papers were given to conference participants on site.

All accepted papers were published in two soft-bound volumes of IPDO-2007 Proceedings and mailed to the conference participants within three months after the symposium was finished. Each of the two volumes of the IPDO-2007 Proceedings had approximately 400 pages.

A CD with .pdf files of all papers was also mailed to all participants. It is added to this report.

Dulikravich, G. S., Colaco, M. J., Orlande, H. R. B. and Tanaka, M. (editors):

*Inverse Problems, Design and Optimization (IPDO-2007) Vol. I*, ISBN: 978-1-59916-279-9, Florida International University, Miami, FL, June 2007.

Dulikravich, G. S., Colaco, M. J., Orlande, H. R. B. and Tanaka, M. (editors):

*Inverse Problems, Design and Optimization (IPDO-2007) Vol. II*, ISBN: 978-1-59916-280-5, Florida International University, Miami, FL, June 2007.

Internet Dissemination: All papers presented at the IPDO-2007 were also posted on the IPDO-2007 website <http://www.ipdos.org/ipdo2007/> and made available to all of those that registered and/or attended IPDO-2007.

Journal Publication: Each author submitting a paper for presentation at the IPDO Symposium had an option to request that his/her paper, if addressing the general field of inverse problems, be reviewed and considered for a possible publication in the international journal *Inverse Problems in Science and Engineering* (IPSE) published by Taylor & Francis. Consequently, 58 of the 99 papers that were presented at IPDO-2007 were fully reviewed by three reviewers each. Eleven papers were rejected and 48 full extended reviewed papers were accepted for publication in 6 special issues of the international journal *Inverse Problems in Science and Engineering*. All issues are to appear in IPSE in 2008.

**Table 4. IPDO-2007 PAPERS: CODE NUMBERS, TITLES AND PAGES IN THE PROCEEDINGS**

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003	INVERSE ANALYSIS APPLIED FOR DETERMINATION OF STRAIN – STRESS CURVES FOR STEEL DEFORMED IN SEMI-SOLID STATE	001
004	DETERMINATION OF THE LEADING COEFFICIENT IN FOURTH-ORDER STURM-LIOUVILLE OPERATOR FROM BOUNDARY MEASUREMENTS	009
006	DYNAMIC OBSERVERS BASED ON GREEN FUNCTIONS APPLIED TO 3D INVERSE THERMAL MODELS	015
008	PROJECTED GRADIENT METHODS FOR SYNCHROTRON RADIATION SPECTRA DISTRIBUTION FUNCTION RECONSTRUCTION	023
009	A NOVEL 3D MEASUREMENT SCHEME WITH ADAPTIVE FUZZY NETWORK MODEL RECONSTRUCTION	029
010	DETERMINATION OF DYNAMICAL LOAD DISTRIBUTIONS APPLIED TO MINDLIN PLATES BY PSEUDOSPECTRAL METHOD	037
011	STABLE NUMERICAL EVALUATION OF GRÜNWARD-LETNIKOV FRACTIONAL DERIVATIVES	044
012	FRACTIONAL IHCP WITH HALF TIME GRÜNWARD-LETNIKOV DERIVATIVES	049
013	ABOUT THE OPTIMUM DESIGN OF AN AIRCRAFT PRESSURE BULKHEAD BY USING MULTI-FIDELITY AND LIFECYCLE ALGORITHM	055
015	ESTIMATION OF THERMAL RESISTANCE DURING SURFACING BY WEDDING – SENSITIVITY ANALYSIS	063
017	OPTIMUM THERMAL MODES IDENTIFICATION OF POST-IMPLANTATION ACTIVATION ANNEALING OF SEMICONDUCTOR MATERIAL	070
020	QUANTITATIVE MILLIMETRE-WAVE IMAGING VIA THE GLOBALLY CONVERGENT CONVEXIFICATION ALGORITHM	078
021	ASPECTS OF APPROXIMATE OPTIMISATION: OVERCOMING THE CURSE OF DIMENSIONALITY AND DESIGN OF EXPERIMENTS	083
023	INVERSE PROBLEM OF THE MEASUREMENTS THEORY	091
024	ROTATING PROJECTION ALGORITHM OF IMAGE RECONSTRUCTION AND APPLICATION FOR ROENTGEN TOMOGRAPHY	096
025	GENERAL RAY METHOD FOR SOLUTION OF DIRICHLET BOUNDARY VALUE PROBLEMS FOR POISSON EQUATION IN ARBITRARY SIMPLE CONNECTED STAR DOMAINS	101
026	HEAT-DISSIPATING CONTROL OF ELECTRONIC DEVICES BY USING A COMBINATION OF LINEAR QUADRATIC GAUSSIAN AND ADAPTIVE INPUT ESTIMATION APPROACHES	106
028	APPLICATION OF THE INVERSE ANALYSIS FOR BOUNDARY CONDITION RETRIEVAL	114
031	SHAPE OPTIMIZATION OF 3D VISCOUS FLOW FIELDS	122
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039	A NOVEL STRUCTURED LIGHT VISUAL SENSOR WITH ADAPTIVE GAUGE LASER HEAD	136
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043	DIGITAL IMAGE INVERSE FILTERING FOR IMPROVING VISUAL ACUITY FOR COMPUTER USERS WITH VISUAL ABERRATIONS	159
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047	A SIMPLE METHOD FOR TOMOGRAPHY RECONSTRUCTION BASED ON A DISCRETE VERSION OF THE TOPOLOGICAL GRADIENT	174
049	CAVITY DETECTION IN BIOMECHANICS BY AN INVERSE EVOLUTIONARY POINT LOAD BEM TECHNIQUE	182
050	AN AUTOMATED APPROACH TO MULTIOBJECTIVE SHAPE OPTIMIZATION FOR ENGINEERING DESIGN PROBLEMS	190
052	TOPOLOGICAL SENSITIVITY ANALYSIS FOR SOURCE PERTURBATION IN TRANSIENT PROBLEMS	198
053	FIRST AND SECOND ORDER TOPOLOGICAL SENSITIVITY ANALYSIS FOR INCLUSIONS	208
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141	FLUID FLOW IN HYDROCYCLONES OPTIMIZED THROUGH MULTI-OBJECTIVE GENETIC ALGORITHMS	692
143	OPTIMAL EXPERIMENT DESIGN AND THERMO-PHYSICAL CHARACTERISATION OF A PLASTICALLY DEFORMED SOLID	701
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145	ENHANCED RADAR CALIBRATION USING PHYSICALLY BASED IMAGE RESTORATION METHODS	715
146	EXTRACTION OF MATERIAL CONSTITUTIVE BEHAVIOR FROM BOUNDARY MEASUREMENTS OF FORCE AND DISPLACEMENTS	723
147	INVERSE CONJUGATE HEAT TRANSFER PROBLEMS: STATEMENTS, CLASSIFICATION, WAYS OF SOLVING	729
148	ON THE USE OF A GLOBAL SEARCH METHOD AND A GRADIENT BASED METHOD FOR THE IDENTIFICATION OF AIRCRAFT LONGITUDINAL STABILITY AND CONTROL DERIVATIVES	735
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150	A COMPARISON OF TWO METHODS FOR FITTING HIGH DIMENSIONAL RESPONSE SURFACES	750
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152	APPROXIMATION OF THE LIKELIHOOD FUNCTION IN THE BAYESIAN TECHNIQUE FOR THE SOLUTION OF INVERSE PROBLEMS	766

**Table 5. IPDO-2007 PAPERS: CODE NUMBERS AND AUTHORS**

PAPER	FIRST AUTHOR		SECOND AUTHOR		THIRD AUTHOR		FOURTH AUTHOR		FIFTH AUTHOR	
	FIRST NAME	LAST NAME	FIRST NAME	LAST NAME	FIRST NAME	LAST NAME	FIRST NAME	LAST NAME	FIRST NAME	LAST NAME
003	Mirosław	Głowacki	Marcin	Hojny						
004	Daniel	Lesnic	Alemdar	Hasanov						
006	Priscila	Sousa	Solidônio	Carvalho	Gilmar	Guimarães				
008	Yanfei	Wang	Yonghua	Du	Tiandou	Hu				
009	Zi	Ma	Huipu	Xu	Aiguo	Li	Ying	Hu	Mitchell	Chen
010	Chen-ming	Ma								
011	Diego	Murio								
012	Diego	Murio								
013	Felipe	Viana	Valder	Steffen Jr.	Sergio	Butkewitsch	Marcus	Leal		
015	Ireneusz	Szczygiel	Adam	Fic	Andrzej	Sachajdak				
017	Alex	Moulthanovsky								
020	Alexandre	Timonov	Michael	Klibanov						
021	Sophie	Trichon	Martijn	Bonte	Jean-Philippe	Ponthot	Ton	van den Boogaard		
023	Vladimir	Zalyapin	Helena	Kharitonova	Stepan	Yermakov				
024	Alexander	Grebennikov	J.	Luna	Tomas	Perez	Manuel	Enriquez		
025	Alexander	Grebennikov								
026	Tsung-Chien	Chen	Shou-Jen	Hsu	Pan-Chio	Tuan				
028	Arkadius	Ryfa	Ryszard	Bialecki	Bruno	Facchini	Lorenzo	Tarchi		

	Z									
031	Eiji	Katamine	Yuya	Nagatomo	Hideyuki	Azegami				
035	Ji	Zhao	Na	Lin	Zi	Ma	Ying	Hu	Xu	Zhang
039	Jin	Huang	Ying	Hu	Zi	Ma	Shuanghe	Yu		
041	Samuel	Lambrakos	John	Michopoulos	Harry	Jones	Craig	Boyer		
042	Yaakov	Olshansky	Eli	Turkel						
043	Miguel	Alonso	Armando	Barreto	Malek	Adjouadi				
044	Kasra	Daneshkhan	Wahid	Ghaly						
047	Ignacio	Larrabide	André	Novotny	Raul	Feijóo	R.	Lima		
049	David	Ojeda	Eduardo	Divo	Alain	Kassab	Miguel	Cerrolaza		
050	Salvadore	Gerace	Alain	Kassab	Eduardo	Divo				
052	Pablo	Blanco	André	Novotny	Raul	Feijóo				
053	J.	Faria	André	Novotny	Raul	Feijóo	E.	Taroco	C.	Padra
054	Dumitru	Trucu	Derek	Ingham	Daniel	Lesnic				
056	Stan	Kranc	Austin	Mullins						
057	Gerassimos	Athanassoulis	Panagiotis	Gavriiadis						
058	Banghe	Zhu	Eva	Sevick-Muraca	Margaret	Eppstein	Anuradha	Godavarty		
060	Sun	Kim	Sang-Hyuk	Lee	Kyung-Ha	Kim	Se-Hyung	Han	Yeong	Kim
061	Anna	Kučerová	Zuzana	Vitingerová	Matěj	Lepš				
062	Matěj	Lepš								
063	Aleksander	Nawrat	Janusz	Skorek	Andrzej	Sachajdak				
066	Ashley	Emery								
067	Andrew	Seagraves	R.	Roy						
068	Daniel	Castello	Carlos	Matt						
069	Kenneth	Faller II	Armando	Barreto	Naphtali	Rishe				
071	Ziemowit	Ostrowski	Ryszard	Bialecki	Adam	Fic	Roman	Weber	Marc	Muster
072	Ernani	Volpe	Guilherme	Oliveira	Luis	Santos	Marcelo	Hayashi	Marco	Ceze
073	Renata	Merce	Graciela	Doz	José	Brito	John	Macdonald	Michael	Friswell
075	Zaher	Zahab	Eduardo	Divo	Alain	Kassab				
077	John	Michopoulos	Tomonari	Furukawa						
078	Kourosh	Modarresi	Gene	Golub						
081	Roberto	Souto	Valéria	Barbosa	Haroldo	Campos Velho	Stephan	Stephany		
082	Haroldo	Campos Velho	José	Silva	Elcio	Shiguemori				
083	Eduardo	Luz	Haroldo	Campos Velho	José	Becceneri	Débora	Roberti		
084	Aurelio	Araujo	Cristóvão	Soares	José	Herskovits				
085	William	Annicchiarico	George	Dulikravich						
086	Helmut	Sobieczky	Monika	Hannemann						
087	Anssi	Lehikoinen	Arto	Voutilainen	Jari	Kaipio	Stefan	Finsterle	Mike	Kowalsky
088	Haysam	Telib	Luca	Zannetti						
090	Kourosh	Modarresi	Gene	Golub						
091	Gloria	Frontini	Fernando	Otero	María	Messineo	Guillermo	Eliçabe		
092	Brian	Dennis	Weiya	Jin	Richard	Timmons				
093	Matthieu	Bamford	Jean	Batsale	Olivier	Fudym				
094	Viktorija	Volkova	Michael	Kazakevitch						
095	Ana	Cuco	Antônio	Silva Neto	Haroldo	Campos Velho	Fabiano	Sousa		
097	Jader	Lugon Junior	Antônio	Silva Neto	Pedro	Rodrigues				

098	Jader	Lugon Junior	Antonio	Silva Neto	César	Santana				
099	Jader	Lugon Junior	Antônio	Silva Neto						
100	Diego	Knupp	Antônio	Silva Neto	Wagner	Sacco				
101	Marcus	Valle	Marcelo	Colaço	Francesco	Scofano Neto				
103	Roberto	Galski	Fabiano	Sousa	Fernando	Ramos	Antônio	Silva Neto		
104	Ricardo	Padilha	Marcelo	Colaço	Manuel	Cruz				
105	Sergey	Reznik	Pavel	Prosuntsov	Andrey	Zuev				
106	Valério	Borges	Priscila	Sousa	Gilmar	Guimarães				
107	Gligor	Kanevce	Ljubica	Kanevce	Vangelce	Mitrevski	George	Dulikravich		
108	Gligor	Kanevce	Ljubica	Kanevce	Igor	Andreevski	George	Dulikravich		
109	Igor	Egorov	Gennadiy	Kretinin	Igor	Leshchenko	Sergey	Kuptsov		
110	H.	Kunze	Davide	La Torre	E.	Vrscay				
111	H.	Kunze	Davide	La Torre	E.	Vrscay				
112	Carlos	Alves	Nuno	Martins	Nilson	Roberty	Marcelo	Colaço	Helcio	Orlande
115	Sylvie	Breton	Yohann	Redon						
116	Gerhard	Zangerly	Otmar	Scherzery	Marcus	Haltmeier				
117	Fábio	Câmara	Antônio	Silva Neto	Francisco	Soeiro				
118	Ezzat	Chalhoub	Antônio	Silva Neto	Francisco	Soeiro				
119	André	Sena	Leonardo	Ensslin						
120	Nilson	Roberty	Carlos	Alves						
122	Amadou	Handou	Aïcha	Oumarou	Catherine	Mancel	Félix	Mora-Camino		
126	Keith	Woodbury	Suprasanna	Duvvuri	Y.	Chou	Jie	Liu		
127	D.	Bandyopadhyay	Andre	Bénard						
128	Hesham	Elshazly	A.	Anwar	M.	Abdel-Mooty				
129	M.	Abdel-Mooty	Hesham	Elshazly	A.	Anwar				
130	O.	Alifanov	V.	Kolesnikov						
131	Rosângela	Cintra	José	Silva	Haroldo	Campos Velho				
132	Adenilson	Carvalho	Roberto	Souto	Haroldo	Campos Velho	José	Becceneri	Stephan	Stephany
133	Sergey	Reznik	Pavel	Prosuntsov	Vasily	Railyan	Andrey	Shulyakovskiy		
135	Masataka	Tanaka	Youri	Arai	Hisashi	Hayashi				
137	O.	Balima	Y.	Rouizi	Y.	Favennec	D.	Petit		
138	Antonio	Campo	John	Ho						
139	Krzysztof	Kubrynski								
140	Alexander	Ramm								
141	Nirupam	Chakraborti	A.	Shekhar	A.	Singhal	S.	Chakraborty	S.	Chowdhury
143	Foued	Mzali	F.	Albouchi	S.	Nasrallah	D.	Petit		
144	Amvrossios	Bagtzoglou	Justin	Niedzialek	Fred	Ogden				
145	Amvrossios	Bagtzoglou	Emmanouil	Anagnostou	Justin	Niedzialek	Fred	Ogden		
146	Youssef	Hashash								
147	Yuri	Matsevity	Alex	Moultanovskiy	Andrey	Kostikov				
148	Luiz	Góes	Benedito	Maciel	Nei	Brasil Neto	Felipe	Viana	Valder	Steffen Jr.
149	Sumeet	Parashar	Nader	Fateh						
150	Marcelo	Colaço	George	Dulikravich	Debasis	Sahoo				
151	Colin	Fox								
152	Helcio	Orlande	Marcelo	Colaço	George	Dulikravich				



**Table 6. IPDO-2007 AUTHORS AND PAPERS BY COUNTRY**

Country	Number of authors/co-authors	Papers published in IPDO-2007
Brazil	3,4,4,3,3,2,5,3,4,3,4,1,4,3,3,2,3, 3,4,3,3,3,3,2,1,3,5,5,1,2,	006,013,047,052,053,068,072,073,081,082, 083,095,097,098,099,100,101,103,104,106, 117,118,119,120,131,132,148,150,152,
United States of America	1,1,1,2,4,3,2,3,2,4,1,1,2,3,3,1,2, 1,2,2,3,1,1,4,2,2,1,3,4,1,1,2,2,1,	011,012,017,020,041,043,050,056,058,066, 067,069,075,077,078,090,092,126,127,138, 140,144,145,146,149,
Poland	2,3,2,3,2,1,	003,015,028,063,071,139,
P.R. China	3,1,1,5,4,	008,009,010,035,039,
Russia	3,3,4,2,4,	023,105,109,133,
Canada	2,2,2,1,	044,110,111,137,
Italy	2,2,1,1,1,	088,122,130,
France	3,2,3,3,1,	093,115,
United Kingdom	1,1,3,2,	004,054,
Japan	2,1,1,3,	031,135,
Portugal	2,2,1,	084,112.
Macedonia	3,3,	107,108,
Czech Republic	3,1,	061,062,
Mexico	4,1,	024,025,
Ukraine	2,2,	094,147,
Egypt	2,2,	128,129,
Venezuela	2,1,	049,085,
Republic of Korea	6,	060,
Argentina	1,4,	091,
India	5	141,
Germany	2,2,	086,
Tunisia	3	143,
Finland	3,	087,
Republic of China	3,	026,
Belgium	2,	021,
Israel	2,	042,
Greece	2	057,
Austria	2,	116,
New Zealand	1,	151,
The Netherlands	2,1,	
Turkey	1,	
Australia	1,	
Denmark	1,	
Spain	1,	

From this table it is evident that IPDO-2007 Symposium was truly international

## 7. List of all participating scientific personnel showing any advanced degrees earned by them while employed on the project

As per Table 2, it is evident that the entire amount of \$5,000 budgeted in this grant was used strictly for paying stipends for several invited speakers. None of these individuals earned any advanced degrees while funded by this grant.

## 8. Report of inventions (by title only)

There were no inventions or patents that resulted from this funding of this project.

## 9. Bibliography

No literature was consulted when preparing this final report except for the two IPDO-2007 proceedings as follows:

Dulikravich, G. S., Colaco, M. J., Orlande, H. R. B. and Tanaka, M. (editors):

*Inverse Problems, Design and Optimization (IPDO-2007) Vol. I*, ISBN: 978-1-59916-279-9,

Florida International University, Miami, FL, June 2007.

Dulikravich, G. S., Colaco, M. J., Orlande, H. R. B. and Tanaka, M. (editors):

*Inverse Problems, Design and Optimization (IPDO-2007) Vol. II*, ISBN: 978-1-59916-280-5,

Florida International University, Miami, FL, June 2007.

## 10. Appendices

### 10.1 PHOTOS FROM THE IPDO-2007 SYMPOSIUM



Fig. 2 Hotel staff involved with IPDO-2007



Fig. 3 FIU ASME Student Chapter staff



Fig. 4 Opening of IPDO-2007 Symposium



Fig. 5 Technical paper presentations



Fig. 6 IPDO-2007 organizers at the banquet



Fig. 7 IPDO-2007 banquet and awards

## 10.2 Cover pages of Volume I and Volume II books of IPDO-2007 Proceedings

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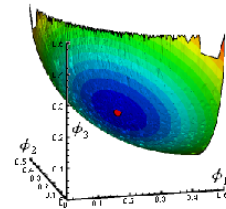


Volume 1 INVERSE PROBLEMS, DESIGN AND OPTIMIZATION IPDO-2007

# INVERSE PROBLEMS, DESIGN AND OPTIMIZATION (IPDO-2007)

## Volume I

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George S. Dulikravich  
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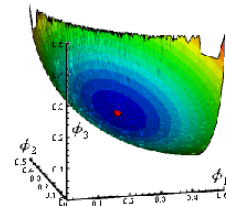


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Sincerely,

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